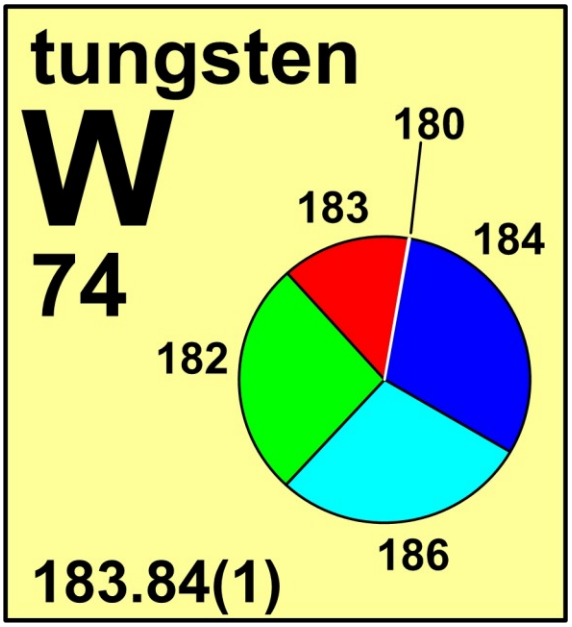
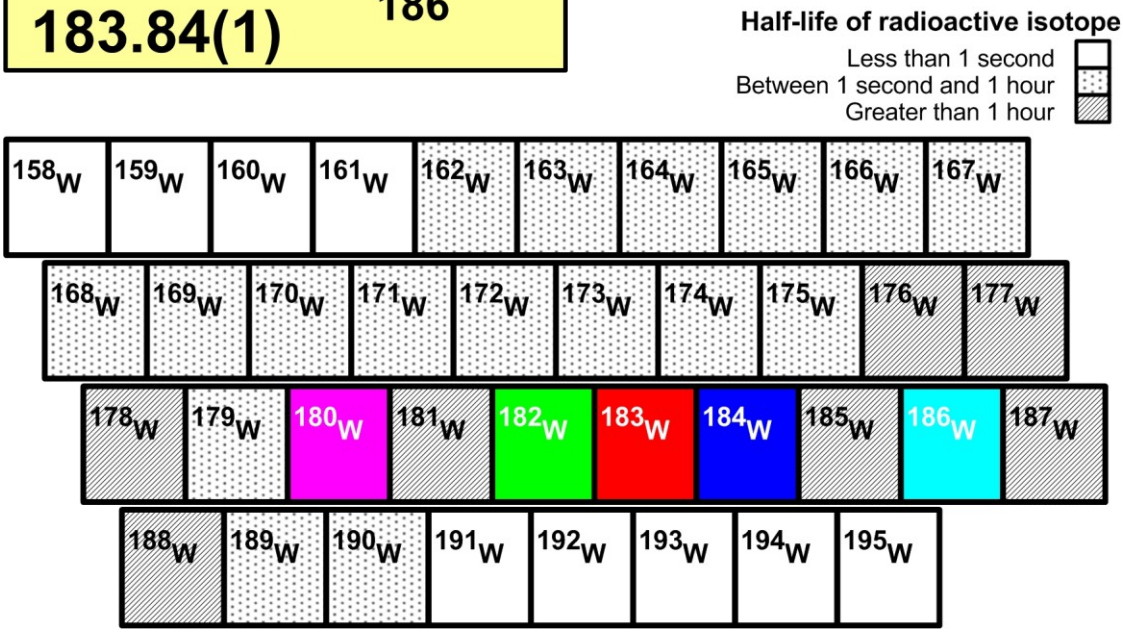
tungsten



Stable isotope	Atomic mass*	Mole fraction
^{180}W	179.946 704	0.0012
^{182}W	181.948 2042	0.2650
^{183}W	182.950 223	0.1431
^{184}W	183.950 9312	0.3064
^{186}W	185.954 3641	0.2843

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in geochronology

1) ^{182}Tungsten is the stable daughter product of the decay of ^{182}Hf with a half-life of 9 million years. While ^{182}Hf was present at the dawn of the Solar System, this isotope has long since decayed away. During the formation of the planets, including Earth, the elements hafnium and tungsten were partitioned into silicate minerals and metal phases, respectively. The measurement of excessive amounts of ^{182}W, arising from the decay of ^{182}Hf, that accumulated in silicate minerals can be used to estimate the time that elapsed between the formation of the Solar System and accretion of the planets.

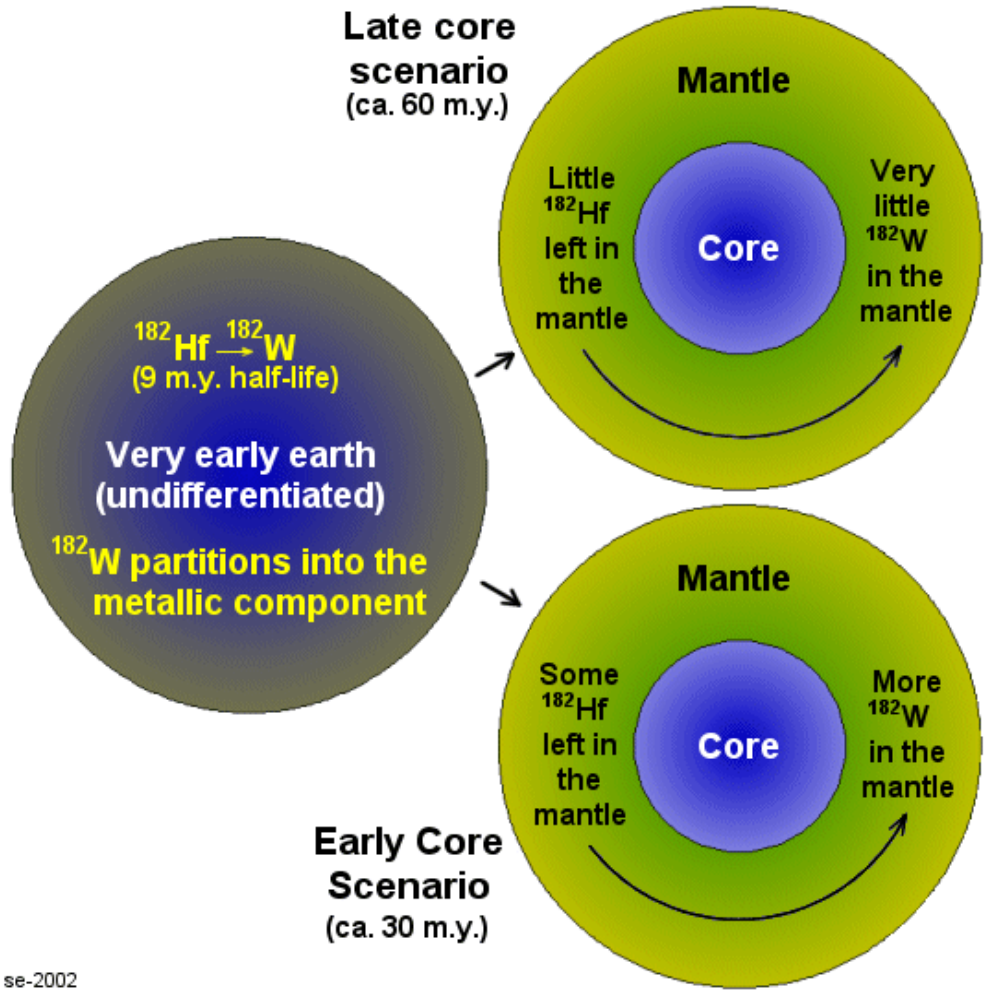


Figure 1: Core formation scenarios. ^{182}Hf is produced during the end stages of a super nova explosion and decays to ^{182}W. The Early Core Scenario shows that when a core forms relatively early after a super nova explosion, a small amount of ^{182}Hf will be present in the mantle that will produce a significant amount of ^{182}W. The Late Core Scenario shows that ^{182}Hf was produced and decays to ^{182}W prior to the formation of the metallic core. Once the metallic core begins to form, it will attract W since it is strongly attracted to metals. Almost all of the ^{182}W is partitioned into the metallic core and only a small amount will be left in the mantle. (Diagram Source: Steven Earle, Vancouver Island University).

Isotopes in medicine

1) ^{180}W is used to produce ^{181}W, which is a therapeutic radioisotope.
2) Tungsten-Rhenium generators use ^{188}W, which is produced from ^{186}W. ^{188}W decays to ^{188}Re in the generator and can be used to produce a solution of Sodium perrhenate ($Na^{188}ReO_4$). Sodium perrhenate-^{188}Re can be used for radiopharmaceutical labeling and for brachytherapy.